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TITLE: Time of Useful Consciousness in  
Crewmembers During Hypobaric Chamber Flights

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## TIME OF USEFUL CONSCIOUSNESS IN CREWMEMBERS DURING HYPOBARIC CHAMBER FLIGHTS

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**MATERIAL AND METHODS** – The authors studied the times of hypoxia in 43 Portuguese Air Force military people, during hypobaric training chamber flights.

The times were measured since the moment the trainees took off the oxygen mask until they began to breathe again 100% oxygen, this time being considered as the time of useful consciousness.

The hypobaric chamber flights take place during the basic and refreshment physiological training courses of our crewmembers, according STANAG 3114.

The flight is preceded by a period of denitrogenation of 35 minutes. During this period we go to 5,000 feet and after to sea level, at a rate of ascent and descent of 5,000 feet per minute, to perform a ears and sinus check.

The hypoxia demonstration is accomplished at 25,000 feet, after a rapid decompression that takes place between 12,000 and 19,000 feet.

The duration of hypoxia demonstration is due to safety reasons usually limited to a maximum of 5 minutes. After this demonstration we performed another one to show the reduction of visual acuity at night, under hypoxic conditions. This demonstration is performed at 18,000 feet.

During the hypoxia demonstration we want the crewmembers to memorize their symptoms, by order of appearance, and this is another reason why we limit the time of exposure to 5 minutes.

Simultaneously with the withdrawal of the masks we deliver to the trainees a form to fill. This form was prepared by the Psychology Centre of the Air Force, and with it we try to demonstrate the cognitive-motor degradation that appears with the lack of oxygen.

After the demonstration the Physiological Training Officer in charge discuss with each of the trainees their symptoms and their order of appearance.

This study was made with trainees of different groups: pilots, other crewmembers, flight surgeons and HALO paratroopers from the Portuguese Army.

The trainees were 7 females and 36 males, with ages between 25 and 44 years (mean age of 32,24 years); 33 were no smokers (ages 25 to 44 years) and 10 smokers (26 to 38 years).

**RESULTS** – the results we obtained can be seen in the following table:

	Min. time	Age	Max. time	Age	Mean time
Smokers	2' 34"	26	5' 46"	34	3' 55"
Non smokers	1' 35"	30	4' 55"	32	3' 43"

**CONCLUSIONS AND DISCUSSION** – the results obtained in this study seem to point, in general, for an absence of a significative difference between the hypoxia time, age or smoking habits.

Nevertheless, some issues can be discussed:

1 – the small number of this sample is the first one; we continue to collect data from the hypobaric chamber flights to try in a near future, publish more results to complete these ones, in a effort to understand the connection between the hypoxia times and age, smoking habits and gender.

2 – what we have considered the time of useful consciousness, was the time that have mediated between the beginning of hypoxia demonstration and the moment when the trainees began to breathe again 100% oxygen.

3 – the times of hypoxia collected show some variations that we can connect to anxiety, like the crewmember aged of 30, non smoker, that had a time of 1' 53". He was attending a Basic Physiological Course, he was not a pilot and it was his first contact with the hypobaric chamber.

4 – no one of the hypoxia times was correlated with the number of blood red cells of the individual. An explanation we can find is the high number of those cells seen in chronic smokers.